BRD-353
Title Page

DESCRIPTIVE SPECIFICATION

AND

OPERATING INSTRUCTIONS

COLOR TELEVISION RECEIVER

MODEL 950

NOVEMBER 18, 1946

GENERAL ELECTRIC COMPANY

RECEIVER DIVISION

BRIDGEPORT, CONNECTICUT

SERIAL # ________

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PROJECTION
COLOR TELEVISION RECEIVER
MODEL 950
CABLE DIAGRAM T-75J156

I. GENERAL DESCRIPTION

This receiver is designed for the reception of color television signals in the frequency band between 480 and 920 M.C.

The present composite color television signal (September 1946) provides for a vertical field frequency of 144 c.p.s. with a color synchronizing pulse occuring every third field. Hence, the color sequence red, blue, and green repeats at a 48 c.p.s. rate. The vertical fields are interlaced to give a 525 line picture. The line frequency is 37.8 KC.

The audio signal is transmitted by amplitude modulating the television carrier at a 4.75 MC rate. This frequency is referred to as the subcarrier. The sub-carrier is keyed on immediately following the horizontal sync pulse and lasts for substantially the remainder of the horizontal pedestal. The sub-carrier is in turn frequency modulated at the audio rate. Because the audio burst occurs at the time when the transmitter would normally provide horizontal blanking, local horizontal blanking is provided to remove the horizontal retrace as well as the audio burst from the picture tube screen.

The vertical sync pulse is of longer duration than the horizontal sync and is separated from it by conventional circuits. Vertical blanking is incorporated in the composite signal.

The color sync pulse occurs every third field or at 48 c.p.s. This sync pulse consists of a block of pulses whose repetition rate is four times the horizontal sync frequency or 151.2 KC. The duration of this block is the same as the vertical sync pulse (3 horizontal lines) and occurs after the red field vertical sync pulse during the latter part of the vertical blanking.

The color system is additive and uses a 15-1/4" O.D. disc with a non electrostatic plastic center, to which are attached red, blue and green filters. It is placed in the optical system below the cathode ray tube. There are nine filter sections on this disc so that a speed of 960 R.P.M. gives the required 144 filter sections per second corresponding to the field frequency.

Color Television Revisions

Addendum 1

December 26, 1946

The following changes in the General Electric Color Television receivers, models 850 and 950, have been made to permit reception of the color signal which has been revised as of this date.

The method of audio transmission using a burst of a frequency modulated sub-carrier following the horizontal synchronizing pulse imposed upon the video carrier has been discarded in favor of a seperate carrier transmission similar to present black and white television standards. The present audio transmission (December 1946) consists of a frequency modulated carrier located 11 megacycles above the video carrier. Maximum deviation of the modulated audio carrier is plus or minus 75 kilocycles.

Horizontal blanking is now transmitted as part of the composite signal and need not be provided by the receiver as in the past.

The receiver IF amplifier is designed to pass the video IF carrier and modulation components to 10 megacycles. Traps are used to attenuate the audio IF carrier to approximately 10% of mid band value. Conversion takes place in the second detector between the video IF carrier (which serves as a ''local oscillator'') and the frequency modulated audio IF.

This provides a new IF frequency equal to the frequency difference between the audio and video carriers, 11 megacycles.

This 11 megacycle IF which is frequency modulated at the audio rate is passed by the video amplifier and removed at the video output tube by means of transformer T3.

Two limiters are used, V18 and V20, followed by a discriminator and audio amplifiers.

Inasmuch as the 11 megacycle audio is produced by the frequency difference between the audio and video transmitters this frequency is fixed and not affected by tuning the local oscillator. Therefore, the 11 megacycle IF stages and the discriminator must be aligned to this frequency.

The method of horizontal synchronization has been modified to improve operation under noisy conditions. A multivibrator synchronized with the received signal is used to excite a tuned circuit tuned to the horizontal repetition rate. This circuit is used in turn to synchronize a second multivibrator which is used to produce the horizontal sweep. The ''inertia'' provided by the tuned circuit reduces the random variations in timing of the horizontal sweep caused by noise in the received signal.

Horizontal sync pulses from the clipper (V5) synchronize the multivibrator V8. The output is intergrated to produce a sawtooth which is used to excite the tuned circuit consisting of L9 and C40, tuned to 37.8 kilocycles (horizontal repetition rate). The sine wave from the tuned circuit is modified by amplifier V19b and used to synchronize the horizontal multivibrator V17.

Adjustment of horizontal sync circuits.- The horizontal speed control (R168) and the horizontal sync control (R124 on the rear of the sweep chassis) and coil L9 should be adjusted for best horizontal synchronization. Note that over a limited range, adjustment of L9 will produce a phase shift of the raster with respect to the received signal and may be used to correctly place the horizontal return trace during the horizontal blanking.

Adjustment of IF stages.

The IF amplifier is adjusted as described on page 4 with the two traps L329 and L330 detuned, L329 is then adjusted to approximately 111 megacycles and L330 to 110 megacycles. The traps should provide 10 to 1 attenuation over a region 1 megacycle wide and located 11 megacycles from the half voltage point on the overall pass band where the video carrier is normally placed.

The 11 megacycle IF circuits in the sweep unit are adjusted in the usual manner except that the absolute value of the center frequency must be 11 megacycles.

The disc is belt driven by a 1/20 H.P. induction motor whose speed is regulated by varying the applied AC voltage. A reference voltage for comparison with the transmitted color sync pulse is obtained from a commutator mounted on the color disc shaft. Coarse phase adjustment of the color disc with respect to the transmitted color signal is obtained by rotating the commutator brushes. Fine adjustment is made with a control on back of the sweep chassis.

An adjustable pulley is used on the motor to permit setting the motor speed to a value within controlling range of the color sync circuit.

The cathode ray tube used is a 5TP4 which has a white screen suitable for color reproduction.

Front Panel Controls

1. Tuning

   This knob controls the local oscillator frequency, counterclockwise rotation increasing the frequency. The dial is not calibrated.

2. Contrast

   This control adjusts the gain of the IF amplifier.

3. Brightness

   This control sets the bias on the cathode ray tube.

4. Focus

   This control varies the current through the magnetic focus coil.

5. Volume

   The on-off switch is mounted on this control.

II. R.F. AND I.F. UNIT
SCHEMATIC T-75J120

General Description

This unit contains the local oscillator, the antenna tuning section, the I.F. amplifier, the second detector, and one stage of video amplification with a cathode follower output stage.

Present video standards require a dipole antenna, horizontally polarized, with a suitable device to convert the dipole output to single ended output. A coaxial line of 70 ohms impedance is used to connect the antenna to the receiver. A parabolic reflector with an aperture of six feet by 18 inches is desirable to provide additional antenna gain.

The antenna is coupled to the converter, a 1N21B crystal, through a coaxial line transformer. The local oscillator output is coupled to the crystal by means of a pickup loop.

A 6F4 tube is used as an oscillator in a tuned line circuit. The oscillator is tuned above the carrier frequency.

The IF amplifier consists of two staggered triples using 6AK5 tubes. The center frequency is 116 MC. The side frequencies are 111 MC and 121 MC. The overall IF pass band is adjusted for half voltage at 120 MC which corresponds to the video carrier and extends to 110 MC for .7 voltage. The IF gain is approximately 4000.

The second detector and video stages are conventional and are designed to pass video frequencies to 10 MC.

Circuit Adjustments

The staggered IF amplifier is most easily aligned by means of a signal generator of frequency range between 110 to 125 MC and modulated at 400 C.P.S. A 75 ohm resistor is connected between the receiver video output jack and ground, and the 400 cycle output can be observed across this resistor with an oscilloscope or AC meter.

Connect the signal generator to the grid of V303, and peak coil L-308 with the signal generator set to 116 MC. Similarly peak L307 to 121 MC and L306 to 111 MC. Slight readjustment should then be made to produce a flat topped pass band. The signal generator should then be transferred to the grid of V300 and L303 peaked at 116 MC, L304 peaked at 111 MC and L305 peaked at 121 MC. The overall pass band should be flat and 10 MC wide.

The R.F. circuit is aligned by means of an R.F. signal generator, pulse modulated with a frequency range from 480 to 920 MC. The adjustable plunger, screw plug, and trimmer capacitor on the R.F. tuning section are adjusted for maximum output for several frequencies throughout the band. The trimmer capacitor has several adjusting screws to adjust oscillator and R.F. tracking.

The crystal may be replaced by separating the oscillator unit from the IF unit, removing the screw plug at the front end of the tuner section and prying the crystal out.

In reassembling the oscillator unit to the IF unit, care should be used to insure good contact between the IF connector clip and crystal cartridge.

III. SWEEP UNIT
SCHEMATIC W-49J395

General Description

This unit contains two stages of video amplification, vertical and horizontal sweep circuits, audio separation and amplification circuits and color motor control circuits.

The composite video signal is delivered to the sweep unit by a coaxial cable from the RF and IF unit. Two stages of video amplification V1 and V2, give a gain of about 40 with a bandwidth of 10 MC. The output is connected to the kinescope grid. A diode (V3) is used to restore the DC level to the picture signal.

The composite synchronizing signal is separated from the video by clipper tube V5. This sync signal is integrated to provide the vertical sync pulses used to sync the vertical blocking oscillator, V6b, which drives the vertical output tube V7 through the cathode follower V6a. The field frequency is 144 c.p.s.

The horizontal sync pulses are removed from the composite sync signal and lock in the horizontal blocking oscillator V8a which clamps the sweep generator V9 to provide the saw-tooth used to drive the horizontal output tubes V10, V11, and V12. The horizontal sweep frequency is 37.8 KC. Because the high voltage supply and the audio separation circuits are driven by the horizontal sweep circuit, no high voltage or intelligible audio will be obtained unless the horizontal speed control is properly adjusted.

Color Control Circuit

A color sync signal occurs after every third vertical sync signal and precedes the red field. This signal occurs during the vertical pedestal, and consists of a block of pulses of 151.2 KC repetition rate.

The color sync signal is separated from the composite sync signal by means of circuits tuned to 151.2 KC associated with V13. This signal is integrated in the plate of V14b and inverted in V22b to produce a positive color sync pulse of 48 c.p.s. repetition rate on the plate of V22b.

A commutator located on the color disc shaft consists of three copper bars spaced 120 degrees. The three bars correspond to the three sets of three filters on the color disc. The commutator bar together with two brushes and R98, C64, and C65 produces a sawtooth voltage which is applied to a plate and a cathode of V15 (a triode connected back to back), and to the grid of V16b.

The voltage applied to the parallel grids of V15 consist of color sync pulses and a square wave mixed in the common plate load of V22b and V16b. The color sync pulse formation has been described above. The square wave is obtained in the following way: The sawtooth voltage produced by the commutator is AC coupled to the grid of V16b. The magnitude of this sawtooth is such as to drive V16b to saturation.in one direction and to cutoff in the other. Hence, a square wave is produced at the plate of V16b of such polarity that the positive excursion of the square wave corresponds to the lower half of the commutator sawtooth.

Assuming that the color disc has been brought up to synchronous speed, the square wave and color sync pulse composite voltage will consist of a sync pulse superimposed on a positive going square wave. While the magnitude of either the sync pulse or square wave alone is insufficient to overcome the bias and open clamp V15, the sum of these two voltages causes V15 to conduct during the short interval of the color pulse and charges capacitor C67 to the voltage of the sawtooth on the cathode-plate of V15 at that instant. The voltage on C67 remains constant until the next color sync pulse occurs (since there is no discharge path for the condenser) so that the magnitude of this voltage is a function of the phase relation between the color sync pulse (from the transmitter) and the sawtooth (from the color disc). The voltage across C67 is?amplified by the DC amplifier, V16a, and is used to control the speed of the color drive motor.

To aid in bringing the color disc into sync as when the receiver is turned on or stations are tuned in the circuit described above operates in a different manner. Instead of the color sync pulse remaining stationary with respect to the square wave, the sync pulse and square wave will move with respect to each other whenever the color disc is not synchronized. The direction of relative motion will depend upon whether the disc is rotating too fast or too slow.

Assume that the disc is rotating too fast so that the color pulse appears to move slowly to the right with respect to the square wave. During the time when the pulse is superimposed on the positive half of the square wave, corresponding to the time when the commutator sawtooth voltage is changing from a minimum value to one-half its maximum value, the voltage across C67 will change from a minimum to a maximum positive level in a sawtooth manner. Thereafter, while the color pulse is superimposed on the negative part of the square wave, the voltage will remain constant at this level since the clamp V15 is imoperative during the negative part of the square wave as noted before.

The result is a complex voltage wave across C67 having a certain DC level of such magnitude which, when applied to the motor control circuit, tends to prevent the relative motion between the color sync pulse and commutator square wave.

If the color pulse appears to move to the left with respect to the square wave, then during the time the pulse is superimposed on the positive half of the square wave, the voltage across C67 will vary from a maximum positive value to the minimum value corresponding to the minimum voltage of the commutator sawtooth, and the voltage across C67 will remain at this minimum value for the time during which the sync pulse is superimposed on the negative part of the square wave. The DC level of this complex voltage wave across C67 is less than it was in the previous case and produces the opposite effect on the motor control circuit.

After amplification by V16a, the DC voltage across C67 is used to control the bias on the thyratrons V28 and V29 through an antihunt network. The primary of transformer T8 is connected in series with the color drive motor. Thyratron V28 and V29 are connected to the secondary of this transformer and control the motor speed by intermittently conducting at a rate determined by the error signal developed across C67. The impedance which the primary introduces into the motor circuit is determined by the rate at which the thyratrons conduct.

A color pulse detector V14a is incorporated to change the bias of the thyratrons (through amplifier V22a) so that the motor will run at maximum speed in the absence of a color pulse. This permits more rapid color disc synchronization after stations are changed.

Audio Circuit

The audio subcarrier is removed from the screen of video output tube V2, and applied to the gated amplifier V18. This amplifier is gated by multivibrator V17 through cathode follower V8b. The multivibrator is synchronized with the horizontal sweep and the gate width is adjusted by means of a control on the rear of the sweep unit chassis. The width of the gate is adjusted so that amplifier V18 is operative only during the time of the audio burst.

The cathode follower (V8b) is also used to blank the kinescope during the audio burst so that audio signal will not appear on the tube during the horizontal retrace. A second audio IF stage, V19b, is followed by a discriminator, V20, and pulse amplifier V19a. This output is integrated by V21, and delivered to a conventional push-pull audio circuit.

Time Delay Circuit

A time delay circuit is provided to allow the motor to reach operating speed before the motor control circuit is turned on and incidentally to delay the application of plate voltage to the rest of the receiver. This delay prevents cold thyratrons from carrying the motor starting current.

Operation of the delay circuit is as follows: Rectifier V26 is used as a voltage source to charge capacitor C71 through resistor R115. When the voltage across C71 approaches the cathode bias determined by R115 and R116, tube V27 conducts and operates the relay.

Adjustment of Color Drive

The following mechanical adjustment of brushes and color drive assembly should only be necessary if the unit has been disassembled and should be done after the optical system has been completely adjusted, see Section VII.

Rotate the shaft until a commutator bar shorts the two brushes. Fasten color disc to shaft, by tightening the two set screws, and in such a position that one of the green filters is in front of the tube face. The disc should be low enough on the shaft to just clear the tube mount when the focussing lever is pointing toward the back.

Further adjustment can be made with the set operating (use extreme care as 27,000 volts is present at the cathode ray tube) by loosening the four screws that hold the brush block and rotating it with respect to the case.

Adjustment of Color Control Circuit

This adjustment may be necessary to compensate for changes in belt condition. With the receiver tuned to a video signal, throw the color motor switch (rear of chassis) to the "test" position. An oscilloscope connected to test jack J1 (rear of chassis) will show the color sync pulse (obtained from the transmitter signal) superimposed on a square wave (derived from the color disc commutator). Using a variable transformer, vary the line voltage to the receiver until the square wave and color sync pulse are synchronized. They will not lock in under these conditions since the motor control circuit is inoperative with the motor control switch in the test position.

The line voltage should be measured and should be 90 volts ±2 volts. If the line voltage is not within this range the pulley ratio should be changed.

The pulley ratio is changed by loosening the locking ring and rotating the outer flange of the motor pulley with respect to the inner flange. In general, only slight readjustment should be necessary and it will not be necessary to change the belt tension by moving the motor. When the pulley ratio has been adjusted so that the square wave is synchronized with color sync pulse with a line voltage of 90 volts, the receiver should be connected to the regular line voltage supply.

Next, center the color phase control (rear of chassis). The motor control switch should now be thrown to the "normal position and the oscilloscope connected to the test jack should show that the square wave is locked in with the color sync pulse. If not, it will be necessary to adjust the color sync control (rear of sweep chassis). To insure greatest range of control the color sync control should be set as follows: Note the maximum clockwise position of the control where the color disc will lock-in as the motor control switch is thrown back and forth from "test" to "normal". Then note the maximum counter-clockwise position of the control when the color disc locks in. The final setting of the motor control should be midway between these two extremes. The anti-hunt control (rear of chassis) should now be adjusted for minimum hunting consistent with good "lock in" characteristics. It may be necessary to repeat the above adjustment procedure of the color sync.

The brush block on the commutator housing should now be rotated if necessary to phase the color disc so that the spokes which hold the filters to the disc do not appear in the picture, and the picture colors are correct. There, after minor color disc phase corrections may be made with the color disc phase control on the rear of the chassis. The pulleys should be checked occasionally for alignment and presence of oil on the flange.

Coil Alignment

The following adjustments may be necessary in servicing the receiver.

Alignment of Color Separator Circuit - With receiver tuned to a video signal, connect an oscilloscope to test jack J1 (rear of sweep chassis). Remove tube V15. Note that 48 cycle pulses appear on the scope. If any other pulses appear, tune color separator coils L5 and L8 for the best separation of the 48 cycle color pulses from any other pulses that may occur.

Audio IF (Subcarrier) Alignment - To align the discriminator (T6), connect a sweep generator across L9 and connect a scope to the plate of tube 19a. Align discriminator T6 to give a symmetrical wave shape about the center frequency of 4.75 MC. The wave shape should be linear between the discriminator peaks which occur about ±700 KC from the center frequency. To align the IF transformers disconnect the video coaxial line connecting the IF and sweep chassis and connect to a sweep generator. Temporarily replace capacitor C77 with a .001 MF capacitor and connect a scope to the screen (pin 4) of V18. Align IF transformer T5 to give a symmetrical wave shape about the center frequency of 4.75 MC. Replace C77. Leaving the sweep generator connected to the video coaxial line, connect the scope to the plate of V19a and align IF coil L9 to give a symmetrical discriminator wave shape.

IV. HIGH VOLTAGE SUPPLY
SCHEMATIC T-75J142

General Description

This is a separate chassis that furnishes 27 KV regulated and 5 KV regulated to the cathode ray tube.

The horizontal retrace pulse from the sweep-unit is converted into a sawtooth voltage by the discharge tube V601A. The sawtooth voltage is applied to the grid of an amplifier tube V602 whose plate load is the primary of a transformer tuned to 37.8 KC., the horizontal sweep frequency.

The sinusoidal voltage is developed across the secondary of this transformer and is rectified by four 8016 tubes in a conventional voltage quadrupler circuit.

Tubes 601B and V609 are used to regulate the gain of the amplifier to compensate for changes in the output voltage.

The same sawtooth of voltage referred to above is applied to the grid of another amplifier tube V603 in whose plate circuit is the primary of the filament transformer L607. This transformer is tuned to 37.8 KC which is the horizontal sweep frequency.

At the mid point of the quadrupler and through a 50 meg. resistor is taken the 5 KV cathode ray tube focussing voltage which is regulated by V604. From this same point and through a resistance network is taken the voltage to light the neon tube I601 which serves as a voltmeter in conjunction with the control R623. This control has been calibrated and if any part of the circuit is changed it will be necessary to recalibrate.

To use the voltmeter mentioned above it will be necessary to rotate the control clockwise until the neon tube goes out then turn counter-clockwise until the tube lights. The position of the knob pointer with respect to the scale then indicates the voltage being delivered to the cathode ray tube.

Adjustments

Four adjustments are provided: (1) to tune the filament transformer to the horizontal sweep frequency, (2) to tune the high voltage transformer to the same frequency, (3) R611 to set the output voltage, (4) R621 to set the filament voltage for the 8016 rectifiers. To adjust the tuned circuits, set the horizontal speed control to the proper sweep frequency and adjust the position of the iron slug for peak voltage. The filaments of the rectifiers should run of approximately 1.25 volts or by observing the brilliance which should be cherry red.

V. POWER SUPPLY
SCHEMATIC T-75J131

This unit supplied heater and DC voltages for the various other units in the receiver.

Two low voltage DC supplies are provided. One using two 5U4G tubes in parallel supplies 300 volts. The other, using two 5R4GY tubes in parallel delivers 400 volts. This latter supply also provides vertical centering voltage.

A negative supply using one half the 300 volt power transformer and a 6X5GT tube as a rectifier provides bias voltages throughout the receiver. Other voltages are obtained from these supplies, using decoupling filters, as follows:

120 V DC	-	RF and IF Unit
310 V DC	-	Video Amplifiers

Power to the unit is turned on and off by means of a contactor operated by a switch on the front panel volume control.

Two fuses are used. A 5 amp. 3AG fuse protects the power supply and a 5 amp. 3AG Slo-blow fuse protects the color drive motor and blower motor.

Note that the motor fuse should not be replaced while the receiver is in operation. To do so causes the control thyratrons to carry the relatively heavy motor starting current.

VI. AUDIO POWER SUPPLY
SCHEMATIC P-64J824

This is a separate chassis and has a conventional rectifier circuit supplying the 300 volts to the audio output stages. In addition it has an AC outlet where the fan is connected and a 50 ohm wirewound control which is across the filament winding of the Power Supply and has the arm connected to ground. The setting of this control is not critical but it will reduce hum in the multivibrators in the sweep chassis when properly set. The power transformer in this chassis also furnishes the filament voltage for the RF and IF Unit.

VII. OPTICAL SYSTEM

The Optical System in this receiver is the conventional Schmidt System using standard spherical mirror for a 5" projection tube and the corrector plate for a 36" throw. The throw used in this set is only about 33 inches to keep the cabinet height to a minimum.

It will be necessary to remove the color disc from its supporting shaft before adjusting the optical system. For reassembly see Section III.

The method of assembling the various parts in the cabinet is as follows, and should be duplicated if it is every necessary to remove any part of the system:

1. A flat plate with a sighting tube perpendicular to the surface and in the exact center is placed on the front of the cabinet and in the center of the viewing screen opening. This establishes an optical axis which is perpendicular to the screen and in its exact center.

2. With the flat mirror in place and the mounting feet on the spherical mirror, slide this mirror around until its center is on the optical axis established above. Then fasten mounting feet to the cabinet using three #6 wood screws 1/2" long in each leg.

3. Center the corrector plate in hole in the top of the corrector plate and tube stand by means of the three eccentric washers. Then fasten this assembly less cathode ray tube and tube holder to the floor of the cabinet with the center of the corrector plate on the optical axis by sighting through the tube mentioned above.

4. It is now necessary to make the plane of the Corrector Plate perpendicular to the optical axis. This is accomplished by placing a small flat mirror on the top of the Corrector Plate and again looking through the sighting tube. If the reflection of the end of the sighting tube falls back on itself this aim has been accomplished. If it does not it will be necessary to loosen the four screws holding together the two parts of both legs. The top of the stand can then be adjusted due to the sloppy holes around the four screws in each leg. After the plane of the Corrector Plate has been made perpendicular to the optical axis, its center may have shafted. It well then be necessary to readjust the three eccentric washers establishing the position of the Corrector Plate. These washers establish the position of the corrector plate and it is the only part of the system which can be removed and returned to its original position without disturbing its setting.

5. The sighting tube may now be removed as it has no further use. The Spherical mirror has been centered on the optical axis but nothing has been done about aligning its axis with the optical axis and setting it the correct height from the Corrector Plate. By looking down on top of the Corrector Plate, it will be noticed there is a reflection of the hole in the center of the plate. By individually adjusting the mounting feet of the spherical mirror it is possible to make this reflection consentric with the hole.

By adjusting all three mounting feet together the mirror must be set so the corrector plate is 13.54 inches from the vertex of the mirrors sphear. The optical system should now be completed by putting the screen back in front of the cabinet.

6. Now place the cathode ray tube in the center of the holder and clamp it down, using three #8-32 screws and the harness provided, tight enough so the tube won't move in the holder.

(CAUTION: Goggles and glves should always be worn when handling Cathode Ray Tubes).

Place the tube and holder in the stand with the axis of the tube as near perpendicular to the optical axis as can be judged by eye.

All chassis must then be placed in the cabinet and all interconnecting cables attached as proper alignment of the tube in the optical system can only be accomplished with properly adjusted and focussed raster on the face of the tube.

When a raster is obtained, adjust the focussing lever (the large lever in the vertical plane) to give a picture slightly out of focus. If the tube is properly centered two images will be seen parallel to each other. If the tube is not centered the two images will not be parallel. By moving the lever to the left of stand it will be possible to make the two top and bottom edges parallel. The lever toward the back of the stand and under the top is used to make the two sides of the double picture parallel.

The two images now being parallel to each other are changed into one image and properly focussed by using the focussing lever mentioned above. Lock the three slides in this position by tightening the four screws which hold each of the three sliding plates, twelve screws in all, eight available from the top, and four from the side.

K66J109

DRAWN BY [signature] 11-25-46

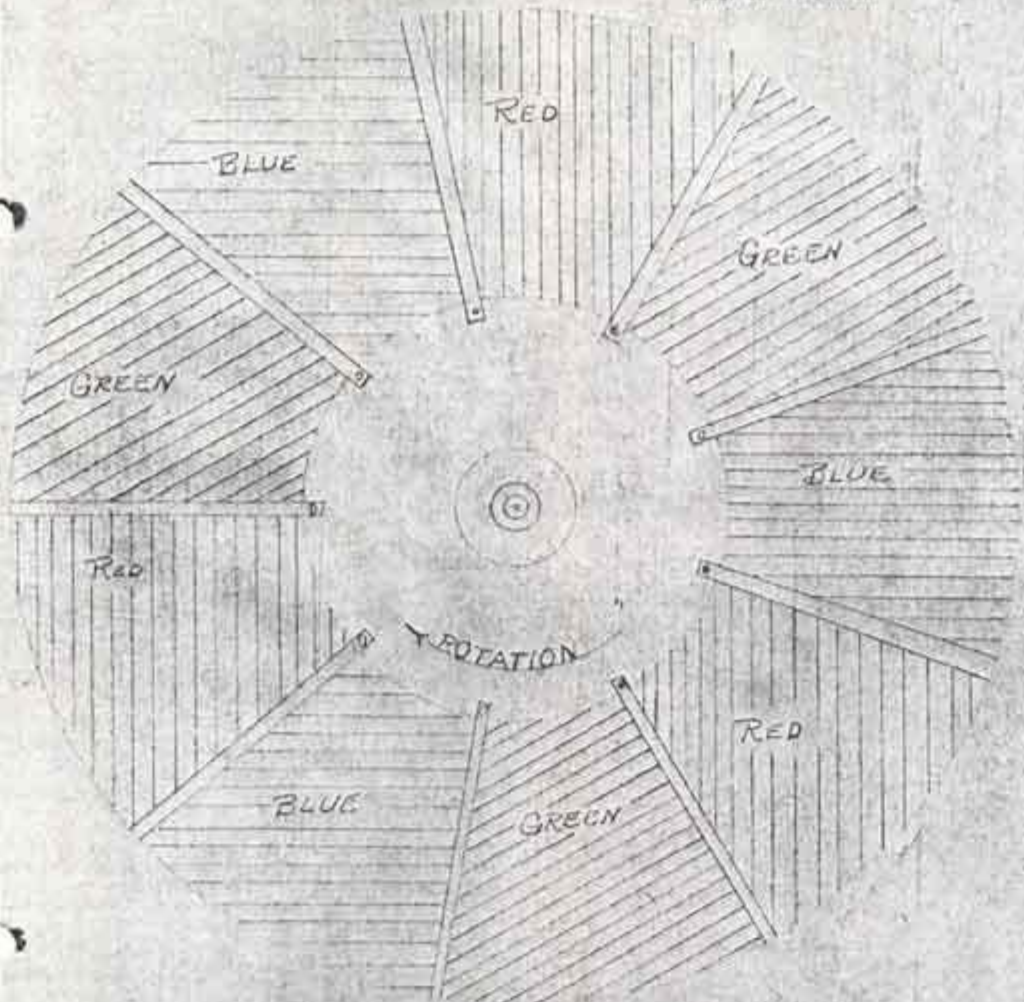
INSPECTED [signature]

COLOR DISC

FIRST MADE FOR 950-C

FIRST CALLED FOR ON

PRINTS TO
RD
RP2
RPD
RSB
RIC
BPW
RIW
RY4
KSP4



RED FILTERS WRATTEN #26

BLUE FILTERS WRATTEN #½ DENSITY 47

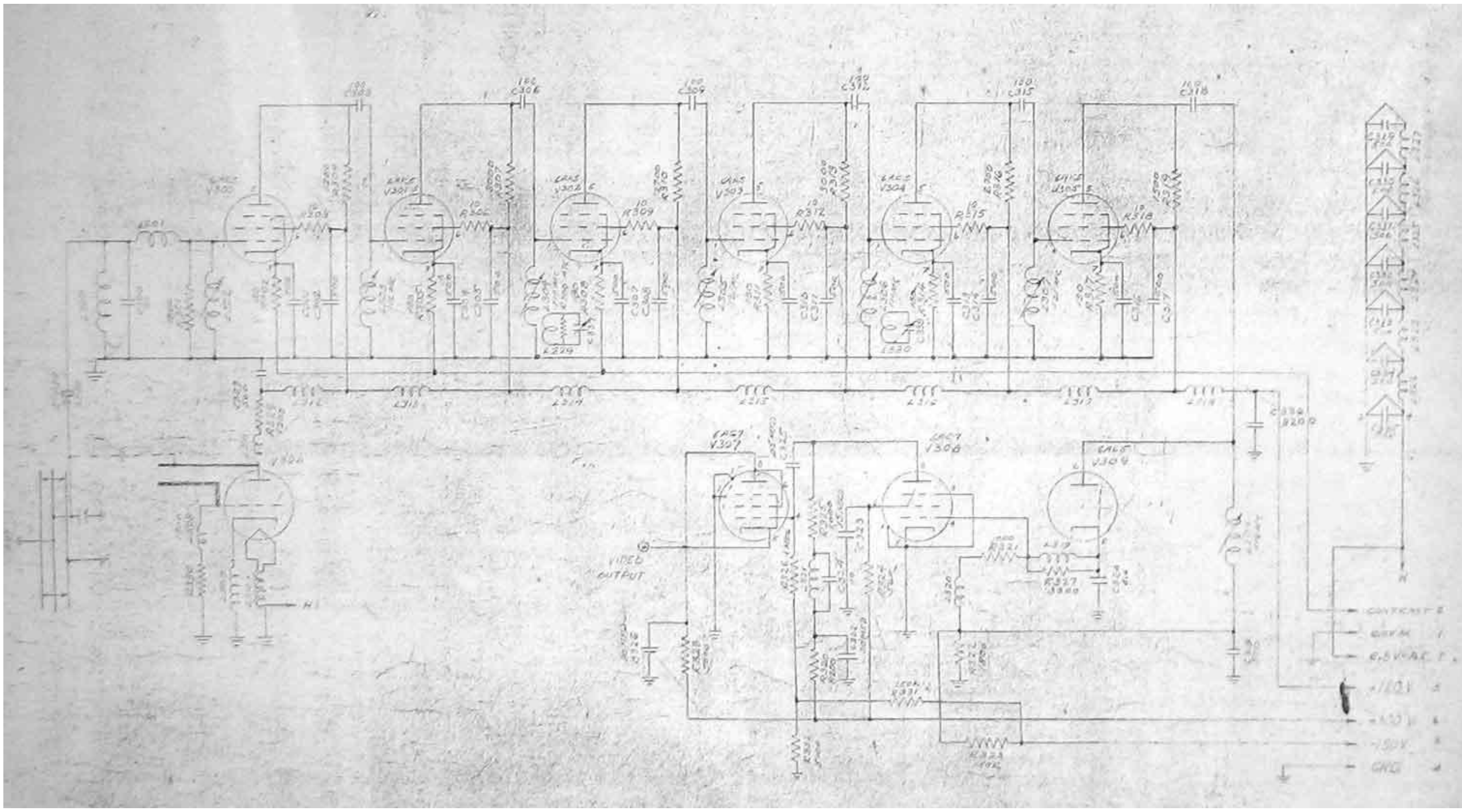
GREEN FILTERS WRATTEN #58

REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS

TOLERANCES: UNLESS SPECIFIED — FRACTIONS ¼" OR LESS ± 1/128", OVER ¼" ± 1/64"; DECIMALS ± .005"; ANGLES ± ONE DEGREE

THIRD ANGLE PROJECTION — GENERAL ELECTRIC BRIDGEPORT WORKS

RB | K-



VIDEO OUTPUT
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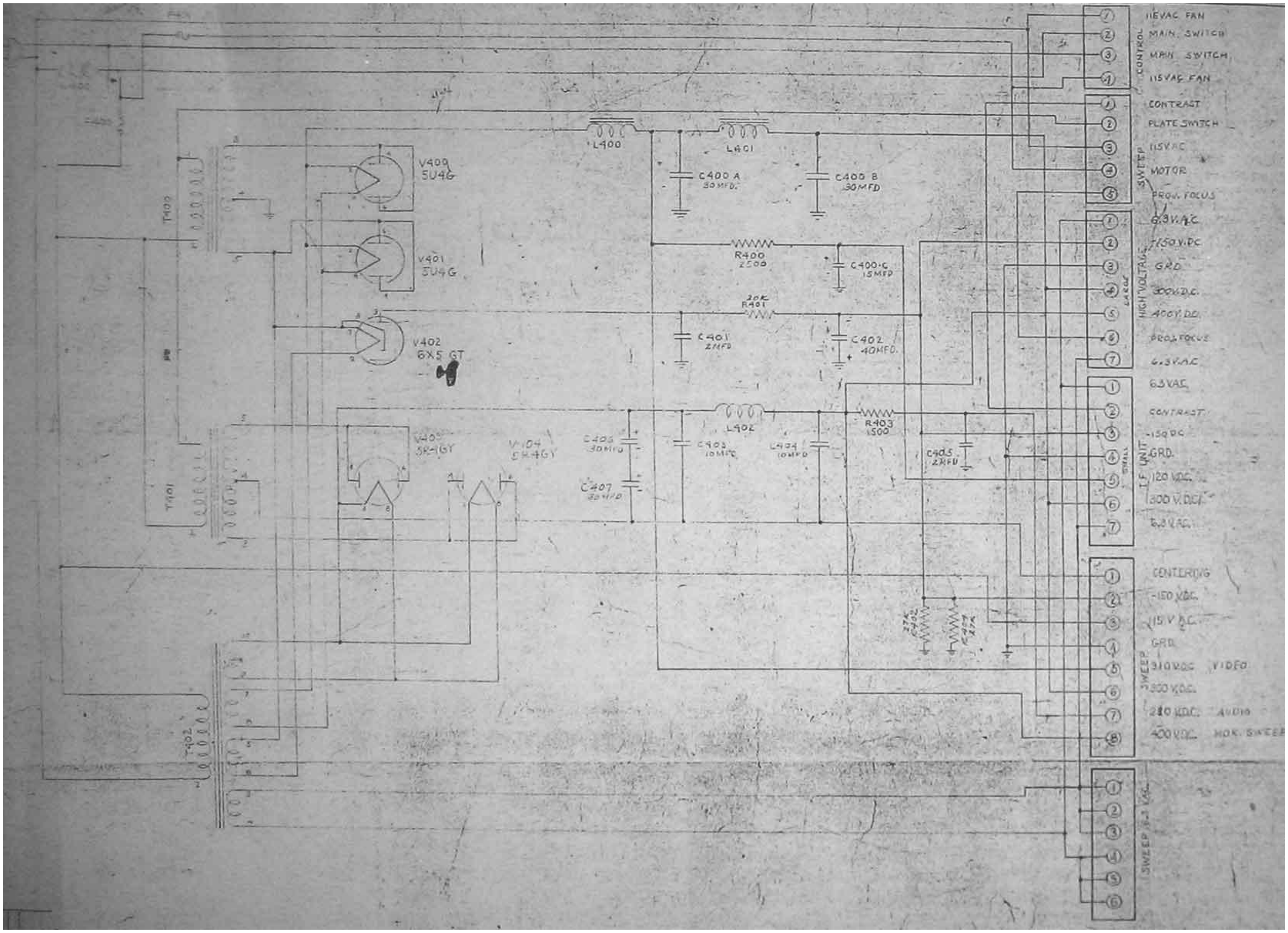
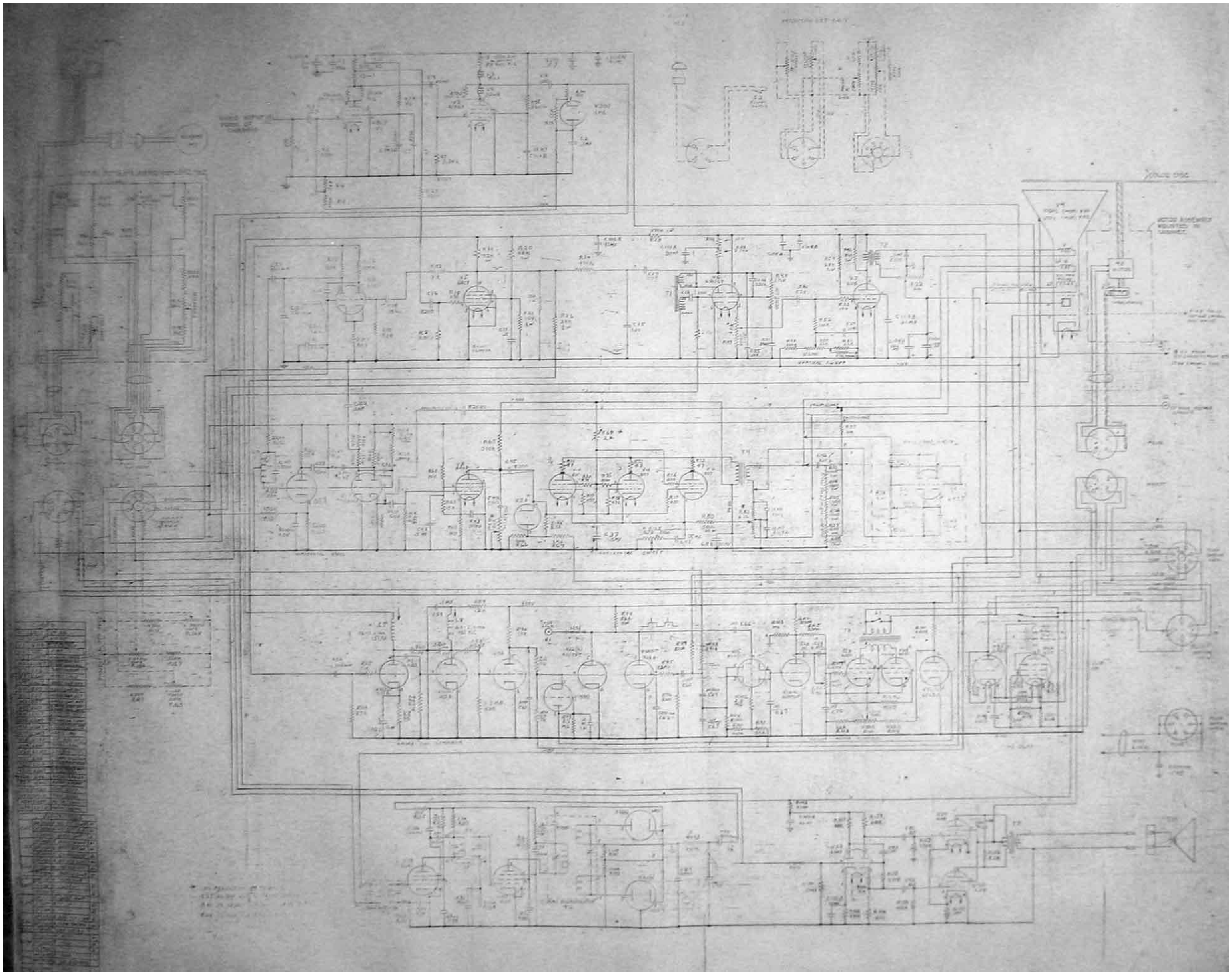
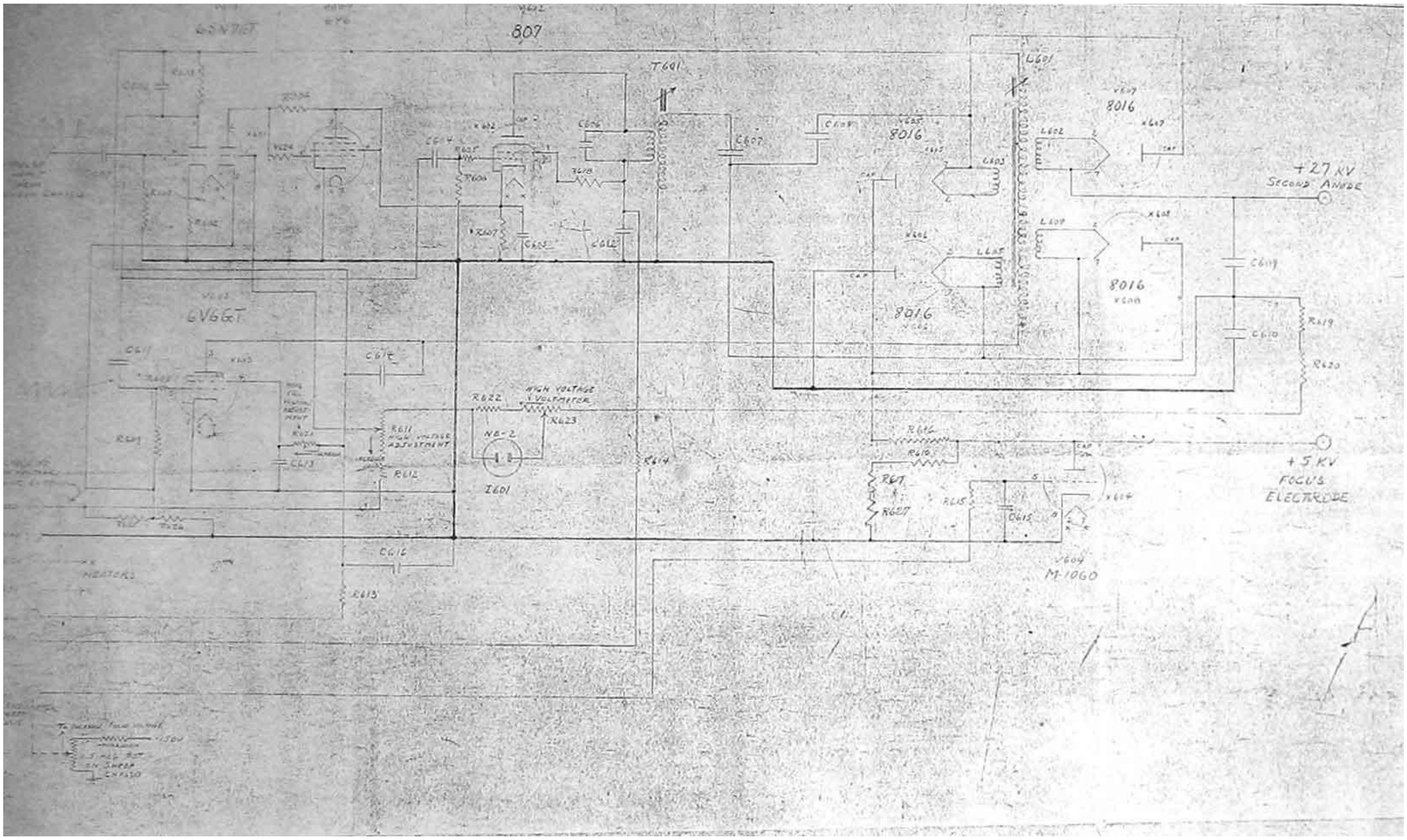
+300 V
-150 V
GRD
6.3 V AC



L400
L401
C400 A 30MFD.
C400 B 30MFD
V400 5U4G
V401 5U4G
V402 6X5 GT
T400
R400 2500
C400-C 15MFD
20K R401
C401 2MFD
C402 40MFD.
V403 5R4GY
V404 5R4GY
C406 30MFD
C407 30MFD
C403 10MFD
L402
L404 10MFD
R403 1500
C405 2MFD
T401
T402
CONTROL
115VAC FAN
MAIN SWITCH
MAIN SWITCH
115VAC FAN
SWEEP
CONTRAST
PLATE SWITCH
115V.AC
MOTOR
PROJ. FOCUS
HIGH VOLTAGE
6.3V.AC
+150V.DC
GRD.
300V.D.C.
400V.DC.
PROJ. FOCUS
6.3V.AC
I.F. UNIT
6.3VAC
CONTRAST
-150 DC
GRD.
120 VDC.
300 V.DC.
6.3VAC.
SWEEP
CENTERING
-150 VDC.
115 V AC.
GRD.
310 VDC. VIDEO
300 VDC.
280 VDC. AUDIO
400 VDC. HOR. SWEEP
SWEEP 6.3 VAC.





6SN7GT
807
T601
L601
8016
8016
8016
8016
+27 KV
SECOND ANODE
6V6GT
HIGH VOLTAGE ADJUSTMENT
HIGH VOLTAGE VOLTMETER
NE-2
I601
+5 KV
FOCUS
ELECTRODE
V604
M-1060
HEATERS